

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 1753

Appl. No. 10/522,461

Amdt. dated August 13, 2007

Reply to Office Action of March 14, 2007

Attorney Docket No. 1455-050205

Amendments to the Specification:

Please replace the paragraph beginning at page 6, line 11, with the following amended paragraph:

-- Thallium atoms have such a simple electronic structure that only three energy states exist below energy of 30,000 cm⁻¹, such as the ground state ($6\ ^2P_{1/2}$: 0 cm⁻¹), metastable state ($6\ ^2P_{3/2}$: 7,793 cm⁻¹), and the excited state ($7\ ^2S_{1/2}$: 26,447.6 cm⁻¹). And thallium atoms have several advantages for efficient optical pumping.

These are:

- (a) large electric dipole moment of the transition between $6\ ^2P_{1/2}$ and $6\ ^2S_{1/2}$ $\underline{7\ ^2S_{1/2}}$
- (b) very short level lifetime of $6\ ^2S_{1/2}$ $\underline{7\ ^2S_{1/2}}$ (7.5 nsec)
- (c) branching ratio of the transition between $6\ ^2S_{1/2}$ $\underline{7\ ^2S_{1/2}}$ and the metastable state is bigger than that of the transition between $6\ ^2S_{1/2}$ $\underline{7\ ^2S_{1/2}}$ and the ground state.

Hence, very efficient pumping of thallium atoms into the metastable state can be easily achieved if a CW laser frequency (about 378 nm in the wavelength) is resonant to the transition line of $6\ ^2P_{1/2}$ and $6\ ^2S_{1/2}$ $\underline{7\ ^2S_{1/2}}$. Because the metastable state population of thallium atoms is lower than 10^{-3} when thallium is heated at temperature to generate an atomic beam, their initial population does not affect the isotope selectivity at this temperature range. --